

Claims:

1. A process for recycling plastic material comprising:
reducing a sample of plastic material to form plastic particles having a desired particle size;
- 5 providing a susceptor agent to the plastic particles which imparts a dielectric property to the plastic particles;
providing a bonding agent to the plastic particles; and
treating the plastic particles with microwave energy to form a usable plastic material.
2. The process according to claim 1 further comprising:
- 10 forming the plastic material into a solid product.
3. The process according to claim 1 or 2 wherein the plastic material is mixed or unsorted waste plastic material.
4. The process according to any one of claims 1 to 3 wherein the plastic particles are formed by shredding, granulating, pulverising or grinding.
- 15 5. The process according to any one of claims 1 to 4 wherein is less than about 50 mm.
6. The process according to claim 5 wherein the particle size is 0.5 to 20 mm.
7. The process according to claim 6 wherein the particle size is between about 1 and 5 mm.
8. The process according to any one of claims 1 to 7 wherein the susceptor agent
- 20 imparts a defined and increased dielectric property to the plastic particles.
9. The process according to claim 8 wherein the susceptor agent is selected from the group consisting of carbon black, hydrocyanic acid, hydrogen peroxide, titanium dioxide, trimethylsulfanilic acid, hydrogen fluoride, formamide, glycerin, acetamide, formic acid, methyl alcohol, p-nitro analine, dimethyl sulfate, hydrazine, maleic
- 25 anhydride, titanium oxide, and mixtures thereof.
10. The process according to claim 9 wherein the susceptor agent is carbon black.
11. The process according to any one of claims 1 to 10 wherein the susceptor agent is added to the plastic particles in a proportion of between 0.01% to 10% (w/w).
12. The process according to claim 11 wherein the susceptor agent is added at a
- 30 proportion of between 0.5% to 5% (w/w).

13. The process according to any one of claims 1 to 12 wherein the bonding agent is a resin formed by dissolving one or more soluble plastics in a solvent.
14. The process according to any one of claims 1 to 12 wherein the bonding agent is formed by adding a soluble plastic to a solvent in a ratio of from 0.75:1 to 2.5:1.
- 5 15. The process according to claim 14 wherein the bonding agent is formed by adding a soluble plastic to a solvent in a ratio of about 1:1.
16. The process according to claim 14 wherein the soluble plastic is polystyrene and the solvent is thinners, toluene or acetone.
- 10 17. The process according to claim 14 wherein the soluble plastic is selected from the group consisting of Acetal, Nylon, PEEK, Polystyrene, Polypropylene, Polyvinyl chloride, High density Polyethylene, Polymethyl methacrylate(acrylic) and mixtures thereof.
- 15 18. The process according to claim 14 wherein the solvent is selected from the group consisting of m-Chlorobenzene, Cyclohexane, Cyclohexanone, Ethyl chloride, Ethyl ether, Furfuryl alcohol, Isopropyl ether, Ketones, Methyl acetate, Methyl chloride, Methyl ethyl ketone, Methylene chloride, and mixtures thereof.
19. The process according to any one of claims 1 to 18 wherein the bonding agent is added to the plastic particles in a proportion of between 1% to 30% (w/w).
20. The process according to claim 19 wherein the bonding agent is added to the plastic
20 particles in a proportion of between 5% to 20% (w/w).
21. The process according to claim 20 wherein the bonding agent is added to the plastic particles at about 15% (w/w).
22. The process according to any one of claims 1 to 21 wherein the susceptor agent is provided with the bonding agent.
- 25 23. The process according to any one of claims 1 to 22 further comprising a colouring agent or other additive.
24. The process according to any one of claims 1 to 23 wherein a vacuum is applied during the process.
25. The process according to any one of claims 1 to 24 wherein the plastic particles are
30 heated with microwave energy to a temperature from 120°C to 230°C.
26. The process according to claim 25 wherein the plastic particles are heated with microwave energy to a temperature of at least about 150°C.

27. The process according to any one of claims 1 to 26 wherein the microwave heating is applied while the plastic particles are agitated or mixed.
28. A plastic material produced by the process according to any one of claims 1 to 27.
29. A plastic product produced from the plastic material according to claim 28.